Environmental Assessment
of the
Strategic Energy Assessment 2008-2014
Docket 5-ES-104

This is the environmental assessment (EA) of the 2008 Strategic Energy Assessment (SEA), which covers the period 2008-2014. The SEA identifies, describes, and assesses different aspects of Wisconsin's electric energy picture for the next seven years. The SEA evaluates the adequacy and reliability of the state's current and future electrical supply (Wis. Stat. § 196.491(2)(a)). The purpose of this EA is to discuss generic issues presented in the SEA and describe their potential environmental impacts.

This EA was prepared under Wis. Stat. § 196.491(2)(f).

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Summary

Wisconsin's Strategic Energy Assessment (SEA) for 2008-2014 describes energy issues influenced by three forces: global warming; federalization of the electric system; and increasing energy costs. The timing and rate at which each of these forces will develop and affect Wisconsin's energy future are uncertain. Another major influence is the evolving implementation of the National Ambient Air Quality Standards. Many decisions made in this period will determine how well Wisconsin adapts to the forces of change. There is a potential for substantive change and the resultant environmental effects are uncertain.

The importance of energy efficiency, conservation, and load control to reducing Wisconsin's energy costs and environmental impacts is highlighted by the findings of the Governor's Task Force on Global Warming (GWTF), as well as by analysis in the SEA. These energy management strategies also keep more money and produce more jobs in the state.

Rising costs will create hardships for people with low incomes. Provisions must be made to address this problem for public health, safety, and environmental reasons. The GWTF has begun work on this issue.

New Electric Transmission Lines

New utility-proposed transmission line projects and plans are located primarily in southern Wisconsin (see Figure 1). Upgrades of existing transmission lines, which sometimes require expanded rights-of-way (ROW) are not shown. The SEA also presents information on transmission analyses produced by the Midwest Independent Transmission System Operator, Inc. (MISO). MISO operates the transmission system in all or most of seven upper Midwestern states, parts of four adjoining states, and one province of Canada. The Federal Energy Regulatory Commission (FERC) regulates MISO, setting standards, procedures, and pricing mechanisms. In one scenario, the MISO analysis shows additional new 345 kilovolt (kV) transmission line construction in Wisconsin (see Figure 2). In other scenarios being studied by MISO for delivery of wind resources, additional extra high voltage may be needed. Those new studies are expected to yield usable results in 2009.

To date, it appears that Wisconsin's goal of 10 percent renewable energy sources by 2015 may not require additional 345 kV transmission line construction. However, an increase in this renewable goal may produce the need for a 345 kV construction scenario similar to the one developed by MISO. The need for increased transmission line construction is a negative impact of the development of major wind farms in the upper Midwest.

Construction of new 345 kV transmission lines can have major environmental effects. Although many existing electric transmission lines have been upgraded in recent years, and such construction will continue through 2014, such upgrades create incremental environmental impacts compared to the impacts of new transmission construction. Higher voltage lines are also

likely to create greater impacts than lower voltage lines. Significant environmental impacts are likely to occur for transmission line construction in the southwestern portion of the state due to its steep and variable topography and for any new transmission line crossings of the St. Croix, Mississippi, or Wisconsin Rivers. If transmission construction is proposed because of increased reliance on wind energy, the discussion of environmental effects becomes more complex. Specific information about proposed transmission line design and routing is needed for a specific assessment of environmental impacts.

Figure 1 Wisconsin utilities' proposed high-voltage transmission line construction (construction to begin before 2015)

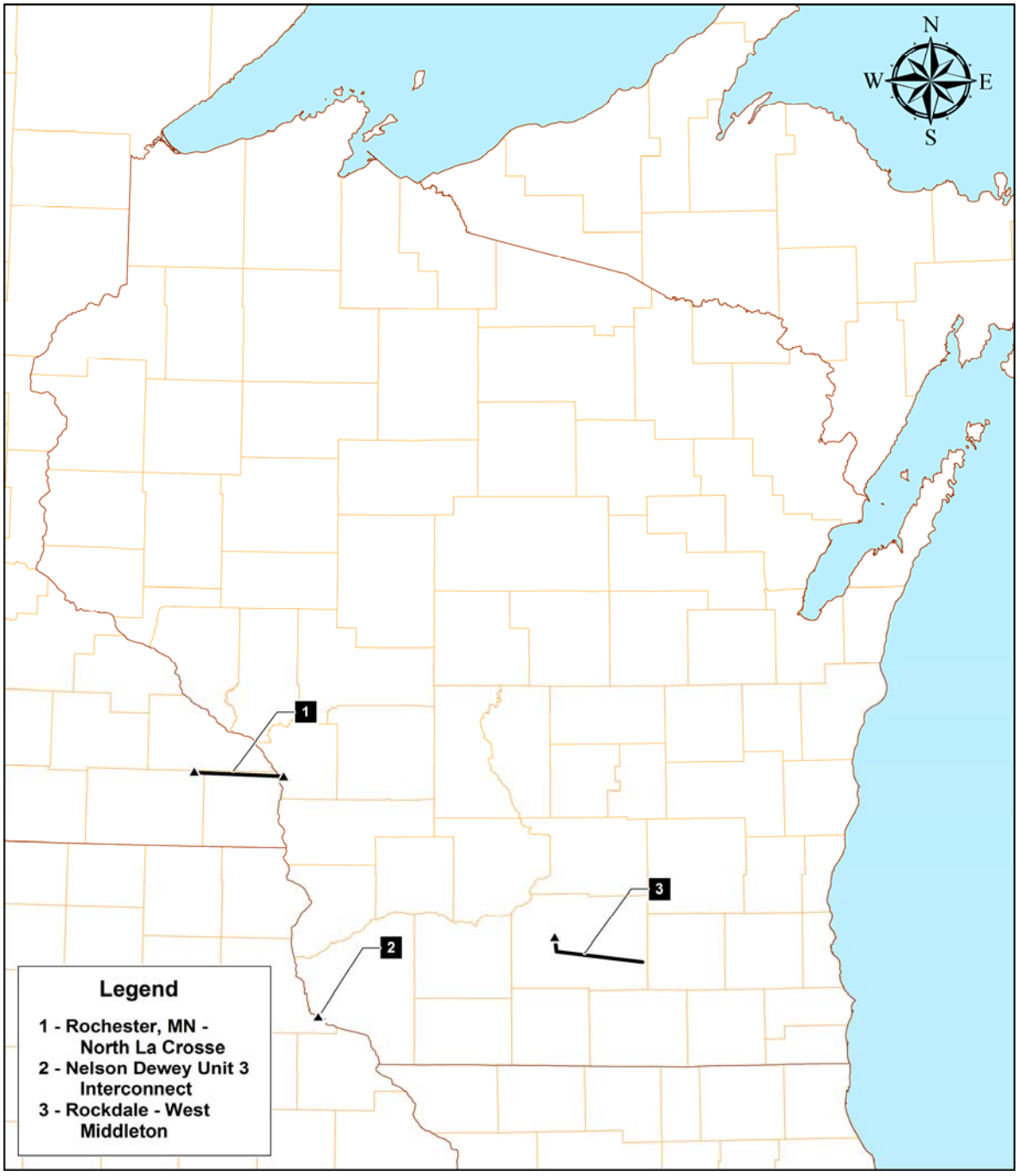
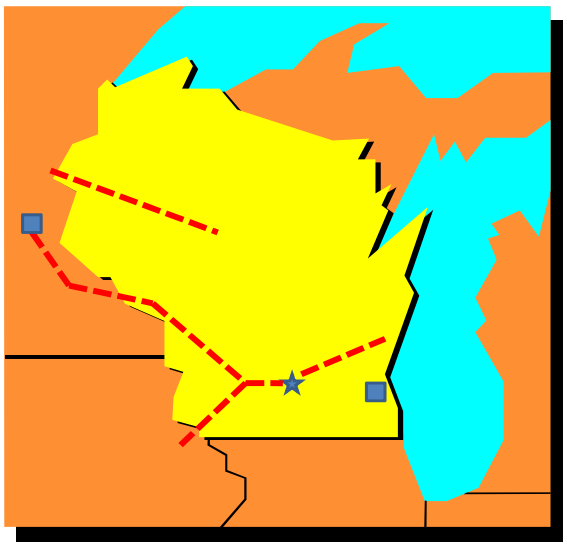


Figure 2 MISO 345 kV transmission scenario for Wisconsin



Specific environmental information is available for one of the three utility-proposed transmission lines shown in Figure 1. The American Transmission Company LLC (ATC) has filed environmental information for its proposed Rockdale-West Middleton 345 kV transmission line, which is available on the Public Service Commission (PSC or Commission) web site. Dairyland Power Cooperative (DPC) and Northern States Power (NSP) have not yet filed an application with the PSC for a proposed 345 kV transmission line from Minnesota to the North La Crosse Substation. This line is part of a larger project to increase reliability in southwestern Minnesota. The shorter 161 kV transmission line shown has been determined by ATC to be needed as an outlet for Wisconsin Power and Light Company's (WP&L) proposed Nelson Dewey coal plant. About 2.0 miles of this line would be built in Wisconsin; the other 15 to 16 miles of 161 kV line would be built in Iowa.

Figure 2 shows a MISO scenario that suggests a Y-shaped 345 kV transmission line may be needed in southwestern Wisconsin. One spur would come from the area near La Crosse to Spring Green; another spur would come from northeastern Iowa to Spring Green; and the last connector would be from Spring Green to West Middleton in Dane County. MISO also indicates another potential 345 kV segment in northwestern Wisconsin, and possibly one from the Madison area to an area north of Milwaukee. No utility has indicated to the Commission that it has plans to construct any of these facilities. MISO itself cannot build the transmission lines, as that is beyond its charter. A new study by Wisconsin utilities is being conducted that will review this scenario.

The Commission has not approved any of the transmission lines shown in the two figures above. A Commission analysis of any future utility application will look at need, environmental effects,

and costs to Wisconsin consumers. Potential environmental effects of electric transmission lines are described in the PSC handbook of that name at http://psc.wi.gov/thelibrary/publications/electric/electric10.pdf

New Generation

Because several factors could significantly affect future energy production, the SEA analyzes six scenarios: a base scenario; a CO_2 monetization scenario; a 25 percent renewable scenario; a high demand-side management (DSM) scenario; and a high (plus 10 percent) and low (minus 10 percent) fossil fuel cost scenario (instead of a limited supply of natural gas scenario).

The SEA analysis shows that increased conservation, energy efficiency, and load control are the least costly means of meeting future energy needs for Wisconsin. These options are also the most environmentally beneficial. The PSC will produce an energy efficiency plan with recommendations to the legislature by the end of 2008.

The only site-specific power plants identified by utilities for 2008-2014 are the proposed Marshfield natural gas combustion turbine (in Marshfield) which was recently approved, and WP&L's proposed Nelson Dewey coal plant (in Cassville), which the Commission will decide on later this year. Commission staff analyses in the SEA show no generation beyond that already approved by the Commission is needed for the state as a whole (except for renewable generating facilities) through 2014. However, optimization of generation on a specific utility basis, rather than a statewide basis, could show different results. Just beyond 2014, the SEA studies indicate need for additional natural gas-fired generation, such as a combined-cycle unit or combustion turbines.

The regulation of air emissions pollutants factors the cost of their health and environmental effects into construction decisions. This increases the likelihood that new generation will produce fewer pollutants. However, global warming gases, such as carbon dioxide (CO_2), are not yet regulated. The SEA provides some analysis of the effect of CO_2 regulation on future generation. The costs of various pollutants used in the SEA analyses are shown in Table 1. As these costs increase, as they are likely to do for CO_2, renewable resources will appear more economically attractive.

Table 1 Pollutant emission costs (2006 present-worth)

Sulfur Dioxide (SO_2)	$400/ton
Nitrogen Oxides (NO_X)	$2,000/ton
Mercury (Hg)	$35,000/pound
Carbon Dioxide (CO_2)*	$22.66/ton

*Used in a sensitivity analysis. The cost of carbon credits on the European market has ranged from $28 to $31.

Wisconsin, along with many other states, is positioning itself to adapt to the real (environmental) costs of carbon emissions with a Renewable Portfolio Standard (RPS). Wisconsin's RPS requires utilities to generate 10 percent of their energy requirements with renewable resources by 2015. The utilities appear to be on track for meeting this requirement. Utilities have built or are proposing wind turbines in Wisconsin, northeast Iowa, and southeast Minnesota. Wind

speeds are higher in Iowa and Minnesota than in Wisconsin. However, the amount of wind generation located out-of-state may require additional transmission construction in Wisconsin. In addition, the intermittent nature of wind may require additional use of combustion turbines for backup power. This in turn may require more combustion turbine or combined-cycle plants and/or upgrades of existing combustion turbines. Upgrades would use new, improved emission controls.

Utilities plan to meet the RPS requirement with wind turbines, because these are the lowest cost renewable option. However, NSP is adding air emission controls that will allow continued operation of its wood-fired boilers in Bayfront; DPC is purchasing 25 megawatts (MW) of wood-fired generation from a private company; and WP&L is proposing to include some capability to burn biomass as part of its proposed coal plant in Cassville. Individual customers are also adding renewable energy sources. For example, some farmers have installed equipment to dry and burn manure or digesters to turn manure into biogas which can then be burned. Some municipalities have applied for funding to install solar systems on public buildings such as schools.

The environmental benefits of wind turbines are the absence of air and water pollutants, the absence of fuel transport impacts, and the absence of ash and other waste disposal. Their placement in farmland provides an extra stream of income to farmers and may delay loss of farmland to urban expansion. The large turbines do change rural scenery and the location of wind resources may require or add to the need for additional high-voltage transmission line construction in Wisconsin. While the impact of individual wind farms on birds and bats does not appear significant, the cumulative effect of wind farms on bird and bat populations in Wisconsin is not yet understood. Combustion of biomass, such as waste wood and switchgrass as WP&L is proposing, emits many of the same air pollutants as coal plants, but fewer toxics, such as lead, arsenic, and mercury.

Due to lengthy construction times, a number of power plants previously approved by the Commission will start operation in 2008-2014. These plants include coal, natural gas, and wind turbines. The pollutant emissions from the coal and natural gas-fueled plants will increase air pollutant emissions in Wisconsin during this period. As an off-set, all large, existing coal plants will have new control equipment for NO_X by 2010. Utilities also plan to add additional emission controls for particulates, NO_X, SO_2 and Hg on existing plants from 2012-2014. During this period, stricter air quality regulations may also cause the retirement of older, smaller, and dirtier coal-fired plants, which have been grandfathered in under current regulations. The types of control equipment and their effectiveness, as well as the specifics of new regulatory requirements, are all uncertain and may cause delays and/or increased costs.

Coordinating Generation and Transmission

The separation of utilities into distribution providers, generation providers, and transmission providers, as well as the federalization of the electric transmission system, has made it more difficult for Wisconsin to ensure that the provision of electric energy is least-cost for Wisconsin consumers. The same is true for ensuring that it creates the least overall environmental impact. MISO is now attempting to coordinate generation and transmission planning under FERC's general directive. The Commission represents Wisconsin in FERC proceedings or participates as a member of the Organization of MISO States. The Commission remains concerned that the

MISO benefit of lowering electric production prices may not be significantly greater than the regulatory and administrative costs of MISO. To date, states still have final review over the need for and construction of specific projects—except where FERC has determined that construction of transmission is in the national interest.

Customer Costs

The cost of energy has and will continue to increase. This is due to many factors, including: higher fuel and material costs, pollution control costs, greenhouse gas reduction costs, and federalization of the electric transmission system. The SEA documents the substantial increase in construction costs, computing that any of the generation plans will cost about $6 billion more than the same plan using construction costs from two years ago.

If increased energy costs lead to lower energy use, this would benefit the environment; however, there will also be adverse environmental impacts of increased energy costs. One result may be increased use of non-EPA certified wood-burning stoves, space heaters, and non-traditional sources of heat such as charcoal grills. Individuals who burn wood in older, inefficient stoves or outdoor wood boilers can significantly increase pollutants in their neighbors' air and increase the potential for fires. Space heaters are an unsafe method of heating, which can cause fires. Other methods of combustion not meant for space heating can cause death through carbon monoxide poisoning.

In addition, in times of rising costs and economic insecurity, environmental protection is often seen as a luxury. The money available for government to spend on environmental stewardship will significantly decrease, as will monetary donations from citizens. Ultimately, global warming may cause significant changes in land use and population densities, as well as changes to Wisconsin's native ecology.

Increased energy costs are likely to have a significant effect on human health and safety. This was recognized by the GWTF, which established an ad hoc low-income study group to explore the issue. Their final report is located at http://dnr.wi.gov/environmentprotect/gtfgw/documents/AHLI_final_report.pdf. A slide show of this report can be found at http://dnr.wi.gov/environmentprotect/gtfgw/documents/McTF20080125.pdf.

While affecting all customers, cost increases will disproportionately affect low-income customers. The GWTF web site includes references to two research papers that link higher energy costs with increased hunger and malnutrition in children under three and in the elderly. Malnutrition in children can affect child development and increase long-term societal costs. The elderly population is projected to grow significantly. Compounding the problem, many low-income customers live in poorly insulated rental housing.

Heat and light are considered essential services in Wisconsin. The importance of maintaining energy service throughout the winter has been recognized for decades in Commission rules restricting disconnection of service from November 1 through April 15. Both the Commission and utilities have recognized the importance of assistance programs in order to reduce the amount of uncollectible bills, which are charged to the ratepayers as a whole.

Some of the ideas presented for further exploration by the report of the low-income study group included:

- expanding the definition of low-income for fuel assistance programs;
- finding a steady source of funding for fuel assistance programs;
- developing programs that improve the energy efficiency of rental housing;
- factoring household income into rates;
- establishing a below-cost rate for a basic block of energy.

Global Warming

Global warming issues are twofold: (1) the environmental effects of global warming on Wisconsin; and (2) the environmental effects of programs to reduce Wisconsin's contribution to global greenhouse gases. As a non-coastal state, Wisconsin is not yet planning for the effects of global warming, although the legislature recently approved the Great Lakes Compact. The GWTF is working to define Wisconsin's contributions to global warming and to generate potential solutions. To date, the GWTF has focused on energy use in Wisconsin, both because the energy sector is a major contributor to greenhouse gases, and because changes to the energy sector are easier to implement than changes to the transportation sector, which is the other major contributor to greenhouse gases.

GWTF issued an interim report in February 2008. The first priority identified by the GWTF is to dramatically increase energy conservation and efficiency. According to the report, "This is essential because Wisconsin must import almost all of the fuel it depends upon today, new power generation is likely to be very costly, and Wisconsin lacks the wind resources of states to the west and the geologic carbon sequestration potential of states to the south. While the state's future renewable resource potential appears to be substantial through the development of bio-energy resources and Great Lakes wind, these resources will take time to become commercial. In the meantime, efficiency must be our top priority."

The Commission has opened five dockets to investigate the GWTF recommendations. An extensive analysis of conservation and energy efficiency potential is underway and recommendations will be made to the legislature by the end of the year. Two study groups are beginning to define the data that needs to be gathered for assessing the potential for locating wind turbines on the Great Lakes and for sequestering CO_2 or shipping CO_2 out-of-state.

The GWTF has suggested the investigation of numerous rate designs. One category of rate designs would give better price signals to consumers by better reflecting the actual costs of energy use over time. A concern with these rate designs is that without some limitation, costs could skyrocket for individual users. To implement these types of rates, utilities also need to provide consumers with easily accessed and timely information about energy costs. Additional factors to consider are the need for and costs of new meters, and concerns about the privacy of personal information. Inverted block rates have also been suggested. Under inverted rates, the more energy used, the greater the cost per unit of energy assessed.
Innovative rate designs have also been suggested as partial solutions to the significant impact of rising costs on lower-income consumers. Some utilities offer "green rates" for consumers who are willing to pay more to ensure that renewable generation is available to offset their energy

use. There are numerous rate design possibilities, including a wider offering of rate options that may currently be available only from a few utilities. The Commission will also consider possible changes in accounting for some utility costs, especially those associated with conservation programs. The Commission's goal is that the public will be given rate flexibility and the ability to make real conservation- and energy efficiency-minded choices that will help curb upward pressure on utility bills.

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